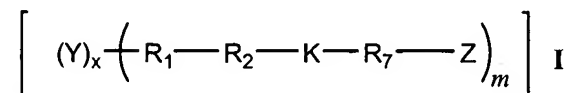


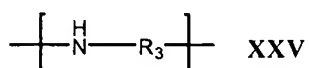
THAT WHICH IS CLAIMED:

1. An alkyl-linked nucleotide composition comprising a general formula:



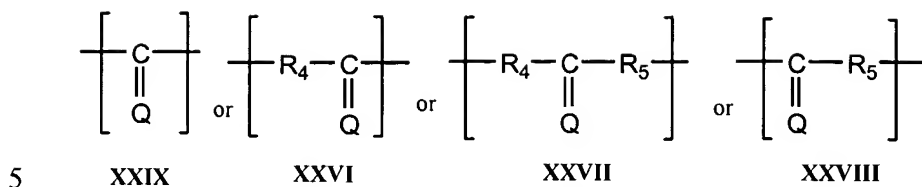
- 10 wherein Y is a solid support, a tag, or a protective group; x = 0 or 1; R<sub>1</sub> is a covalent bond between Y and R<sub>2</sub>, or R<sub>1</sub> is an acyl group, a substituted or a non-substituted alkyl group, a substituted or a non-substituted cycloalkyl group, a substituted or a non-substituted heteroalkyl group, a substituted or a non-substituted heterocycloalkyl group, a substituted or a non-substituted aryl group, a substituted or a non-substituted heteroaryl group, or a  
 15 combination thereof; R<sub>2</sub> is a substituted or a non-substituted alkyl group, a substituted or a non-substituted cycloalkyl group, a substituted or a non-substituted heteroalkyl group, a substituted or a non-substituted heterocycloalkyl, a substituted or a non-substituted heteroaryl group, or a combination thereof; K is a heteroatom; R<sub>7</sub> is (P)<sub>n</sub> where P is a phosphate or thiophosphate and n is at least one or R<sub>7</sub> is a phosphate group mimic, Z is a  
 20 nucleoside or nucleoside derivative; and m is at least one.

2. The alkyl-linked nucleotide composition of claim 1, wherein R<sub>2</sub> comprises a general formula:



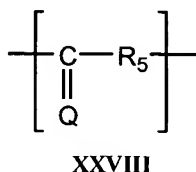
- 25 wherein R<sub>3</sub> is a substituted or a non-substituted alkyl group, a substituted or a non-substituted cycloalkyl group, a substituted or a non-substituted heteroalkyl group, a substituted or a non-substituted heterocycloalkyl, a substituted or a non-substituted heteroaryl group, or a combination thereof.

- 30 3. The alkyl-linked nucleotide composition of claim 2, wherein R<sub>1</sub> comprises:



5            wherein Q = O or NH<sub>2</sub><sup>+</sup>; R<sub>4</sub> is a substituted or a non-substituted alkyl group, a substituted  
 or a non-substituted cycloalkyl group, a substituted or a non-substituted heteroalkyl  
 group, a substituted or a non-substituted heterocycloalkyl group, a substituted or a non-  
 10       substituted aryl group, a substituted or a non-substituted heteroaryl group, or a  
 combination thereof; and R<sub>5</sub> is a substituted or a non-substituted alkyl group, a  
 substituted or a non-substituted cycloalkyl group, a substituted or a non-substituted  
 heteroalkyl group, a substituted or a non-substituted heterocycloalkyl group, a substituted  
 or a non-substituted aryl group, a substituted or a non-substituted heteroaryl group, or a  
 15       combination thereof.

4.        The alkyl-linked nucleotide composition of claim 3, wherein R<sub>1</sub> comprises  
 a general formula:



20        5.        The alkyl-linked nucleotide composition of claim 1, wherein the  
 heteroatom (K) is a nitrogen atom, an oxygen atom or a sulfur atom.

6.        The alkyl-linked nucleotide composition of claim 1, wherein the  
 heteroatom (K) is a nitrogen atom.

25        7.        The alkyl-linked nucleotide composition of claim 1, wherein Y is a solid  
 support.

8.        The alkyl-linked nucleotide composition of claim 7, wherein the  
 30        composition is a nucleotide affinity medium.

5

9. The nucleotide affinity medium of claim 8, wherein the solid support includes at least one member selected from the group consisting of an acrylamide, agarose, methacrylate, cellulose, nylon, silica, glass, ceramic, a magnetized particle, nitrocellulose, polystyrene, a thermoresponsive polymer, and derivatives thereof.

10

10. The nucleotide affinity medium of claim 9, wherein the solid support is a beaded agarose.

15

11. The nucleotide affinity medium of claim 8, wherein the solid support has a loading of an alkyl-linked nucleotide in a range of 5-25%.

12. The nucleotide affinity medium of claim 8, wherein the solid support has a loading of an alkyl-linked nucleotide in a range of 20-50%.

20

13. The nucleotide affinity medium of claim 8, wherein the solid support has a loading of an alkyl-linked nucleotide in a range of 40-65%.

14. The nucleotide affinity medium of claim 8, wherein the solid support has a loading of an alkyl-linked nucleotide in a range of 60-80%.

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15. The nucleotide affinity medium of claim 8, wherein the solid support has a loading of an alkyl-linked nucleotide in a range of 75-100%.

30

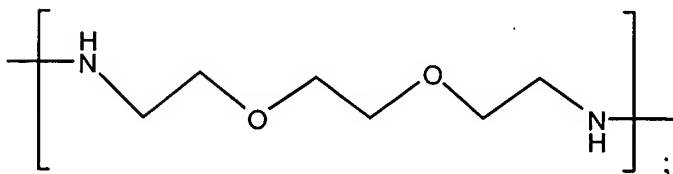
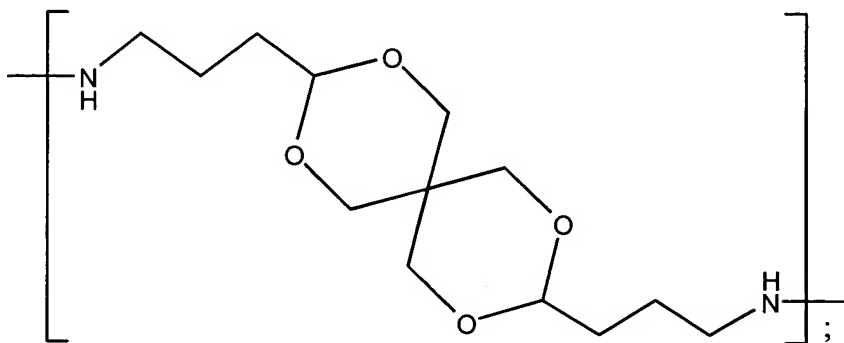
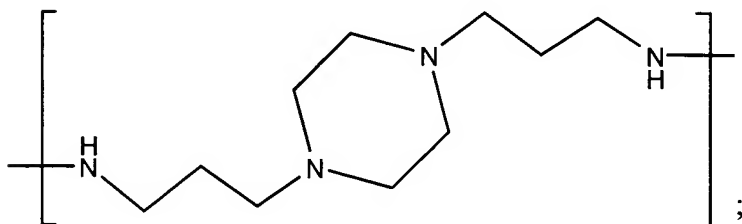
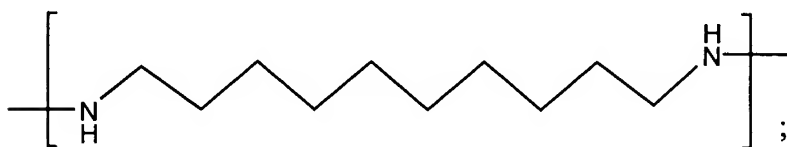
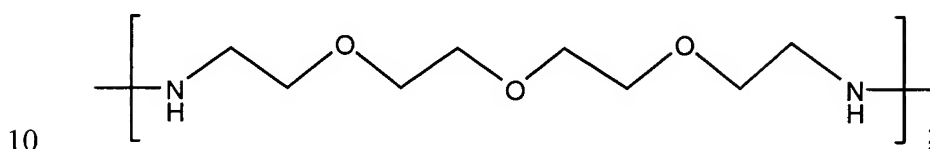
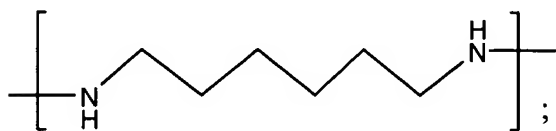
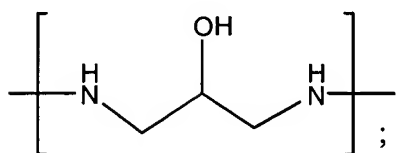
16. The alkyl-linked nucleotide composition of claim 1, wherein the tag is biotin.

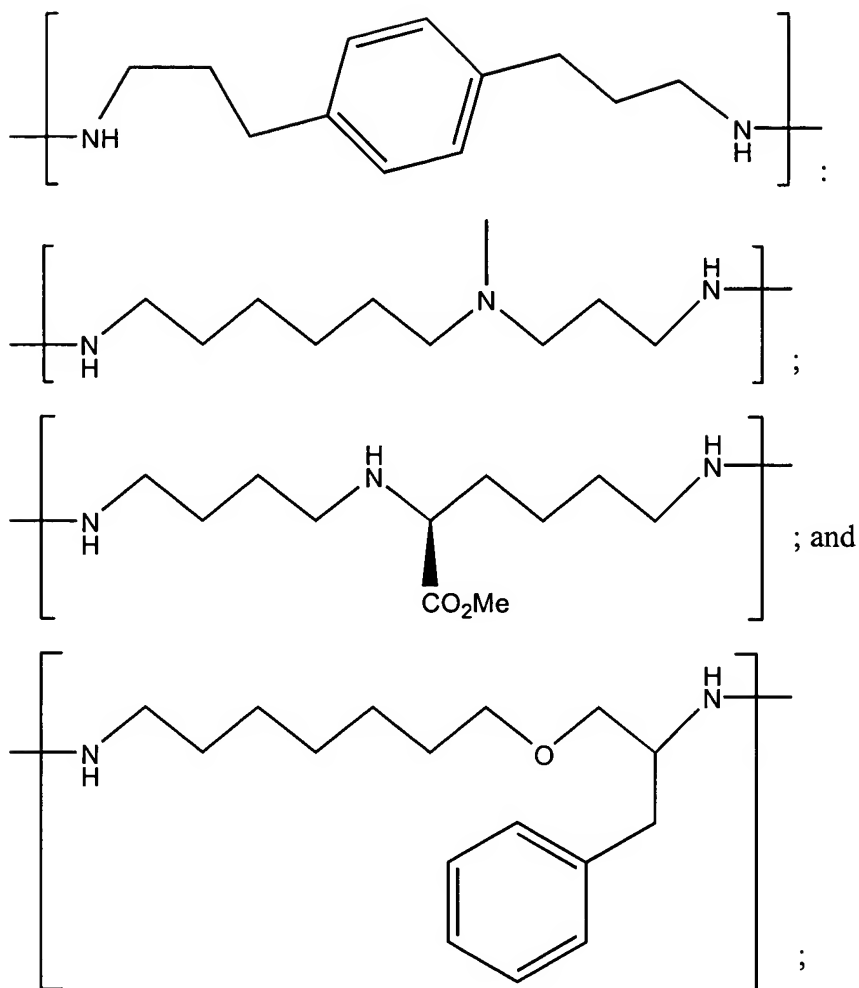
17. The alkyl-linked nucleotide composition of claim 1 wherein  $R_7$  is  $(P)_n$ .

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18. The alkyl-linked nucleotide composition of claim 17, wherein n is 1, 2, 3, or 4.

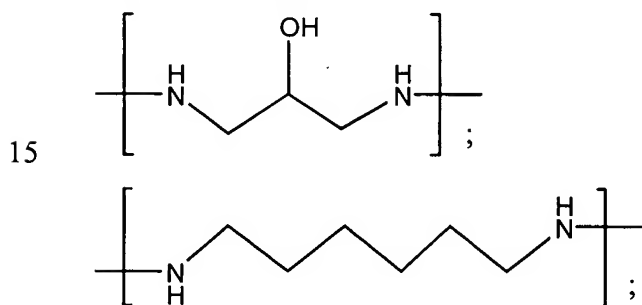
19. The alkyl-linked nucleotide composition of claim 1, wherein R<sub>2</sub> is a linker selected from the group consisting of:





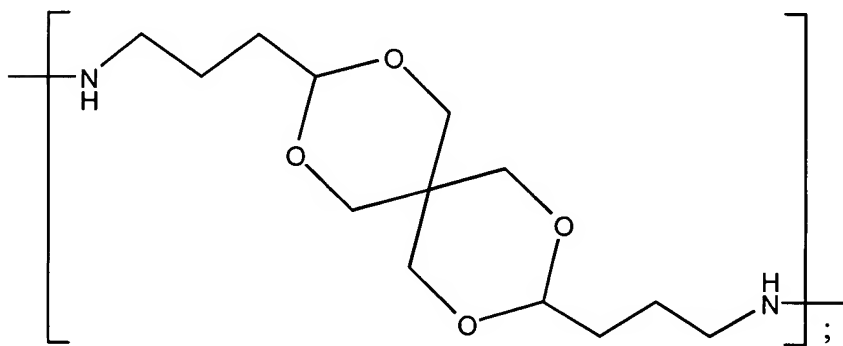
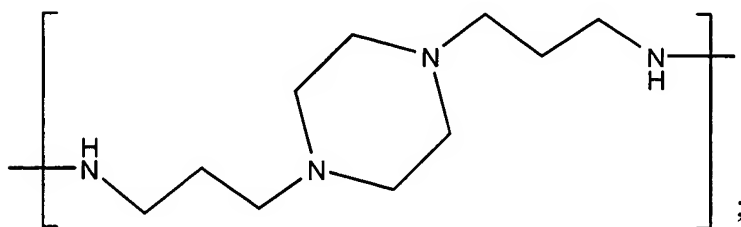
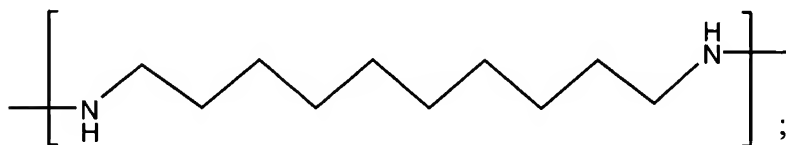
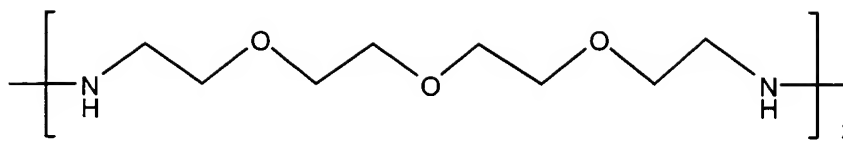
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20. The alkyl-linked nucleotide composition of claim 1, wherein if m is more than one, then R<sub>2</sub> is at least one linker selected from the group consisting of:

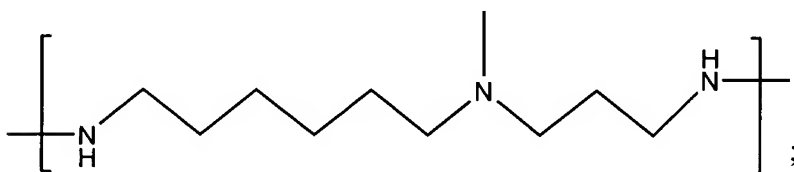
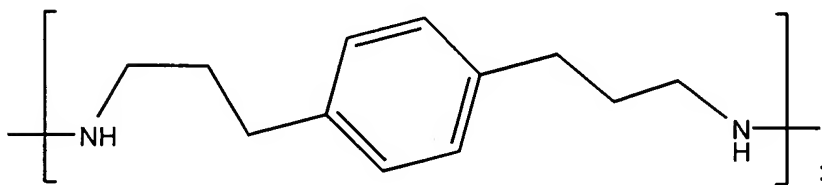
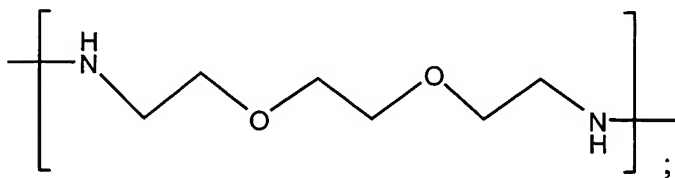


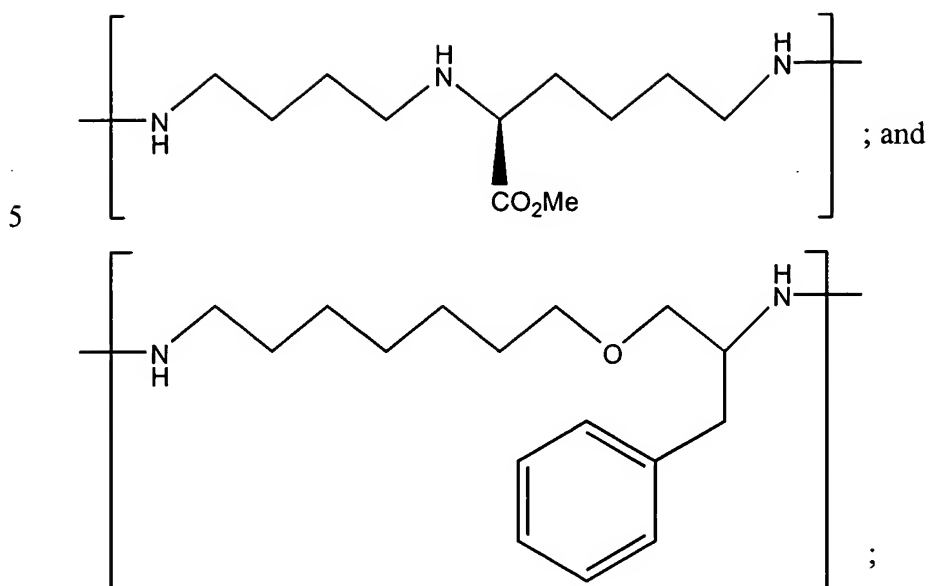
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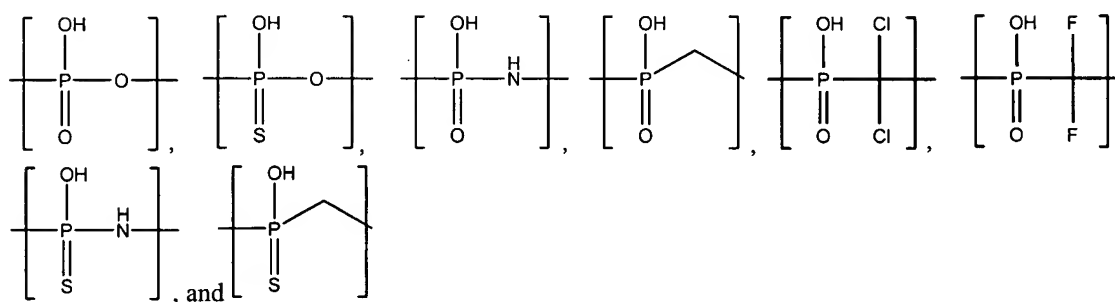


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21. The alkyl-linked nucleotide composition of claim 17, wherein P is selected  
10 from the group consisting of

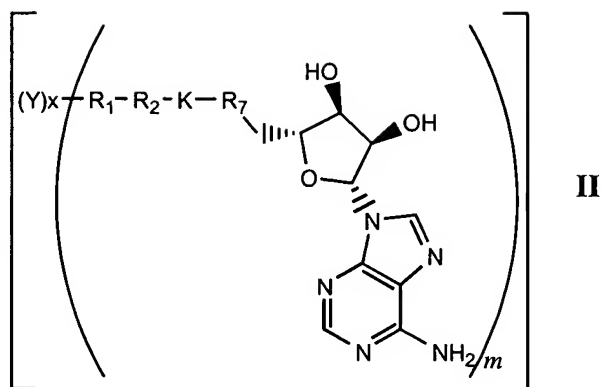


and an ionized variant or a salt thereof.

15            22.        The alkyl-linked nucleotide composition of claim 1, wherein the  
nucleoside is selected from the group consisting of adenosine, guanosine, cytidine,  
thymidine, and uridine, or an analog thereof.

23. The alkyl-linked nucleotide composition of claim 22, wherein the  
20 nucleoside is an adenosine, said alkyl-linked nucleotide composition comprising a  
general structure:

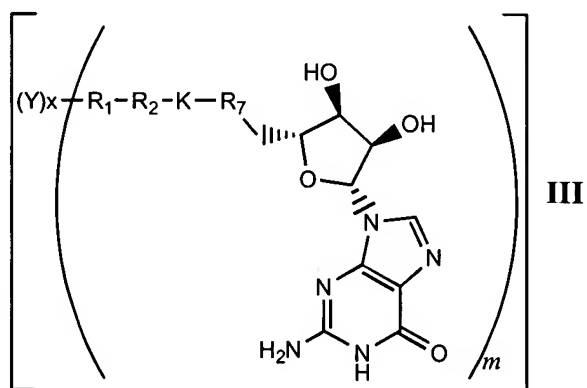
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or an ionized variant or a salt thereof.

10

24. The alkyl-linked nucleotide composition of claim 22, wherein the nucleoside is a guanosine, said alkyl-linked nucleotide composition comprising a general structure:



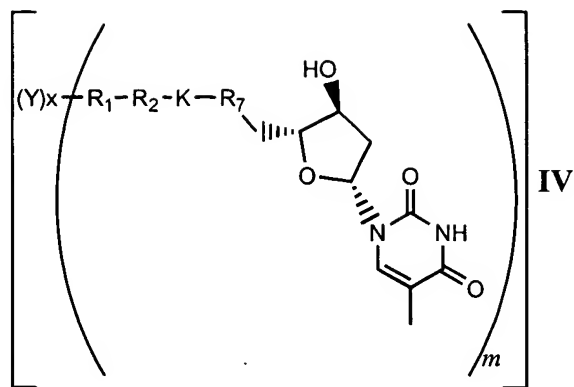
or an ionized variant or a salt thereof.

15

25. The alkyl-linked nucleotide composition of claim 22, wherein the nucleoside is a thymidine, said alkyl-linked nucleotide composition comprising a general structure:



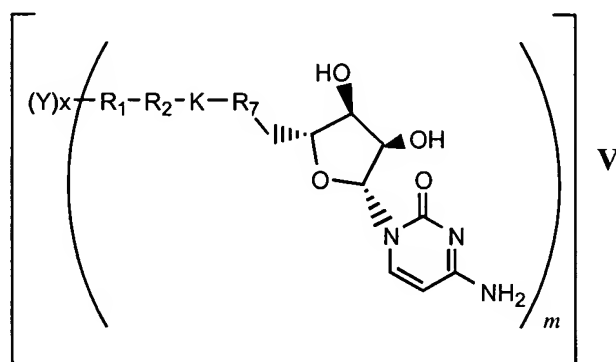
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or an ionized variant or a salt thereof.

10

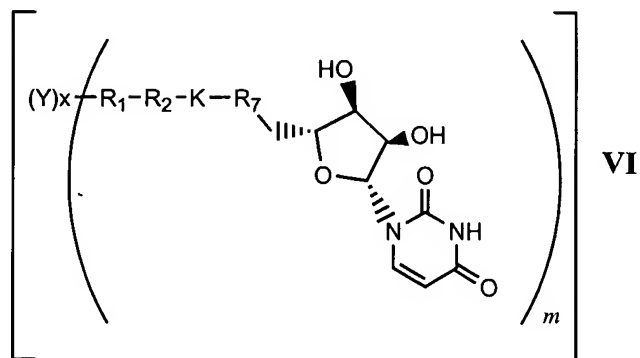
26. The alkyl-linked nucleotide composition of claim 22, wherein the nucleoside is a cytidine, said alkyl-linked nucleotide composition comprising a general structure:



or an ionized variant or a salt thereof.

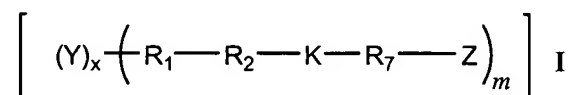
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27. The alkyl-linked nucleotide composition of claim 22, wherein the nucleoside is a uridine, said alkyl-linked nucleotide composition comprising a general structure:



5 or an ionized variant or a salt thereof.

28. A method for synthesizing a nucleotide affinity medium comprising a general formula:



10 comprising the steps of:

a) coupling at least one linker to a solid support or tag in a suitable coupling buffer, wherein said linker is  $R_2$  or a combination of  $R_1$  and  $R_2$ ;

b) end-capping at least a portion of reactive sites remaining on said solid support or tag after said coupling step; and

15 c) reacting a terminal phosphate or thiophosphate group of a nucleotide with said linker coupled to said solid support or tag,

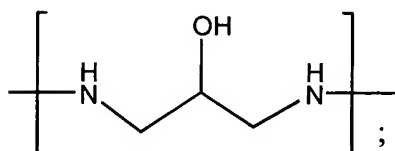
wherein Y is a solid support or a tag;  $x = 1$ ;  $R_1$  is a covalent bond between Y and  $R_2$ , or  $R_1$  is an acyl group, a substituted or a non-substituted alkyl group, a substituted or a non-substituted cycloalkyl group, a substituted or a non-substituted heteroalkyl group, a

20 substituted or a non-substituted heterocycloalkyl group, a substituted or a non-substituted aryl group, a substituted or a non-substituted heteroaryl group, or a combination thereof;

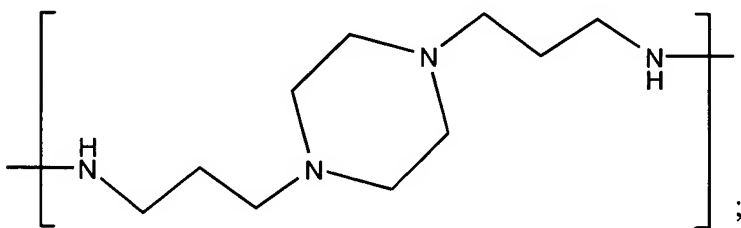
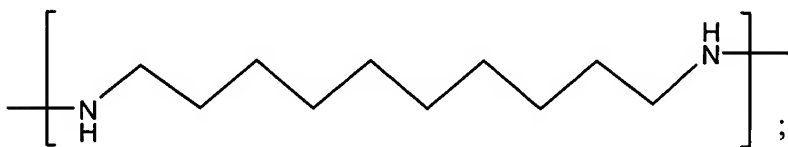
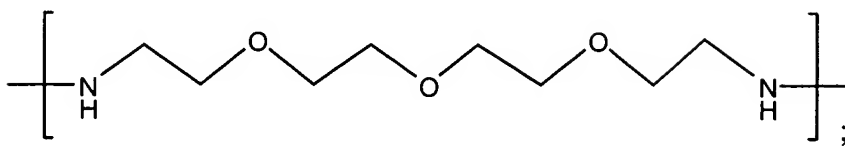
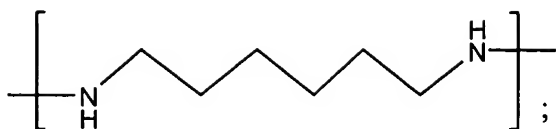
$R_2$  is a substituted or a non-substituted alkyl group, a substituted or a non-substituted cycloalkyl group, a substituted or a non-substituted heteroalkyl group, a substituted or a non-substituted heterocycloalkyl, a substituted or a non-substituted heteroaryl group, or a

25 combination thereof; K is a heteroatom;  $R_7$  is  $(P)_n$  where P is a phosphate or thiophosphate and n is at least one or  $R_7$  is a phosphate group mimic; Z is a nucleoside; and m is at least one.

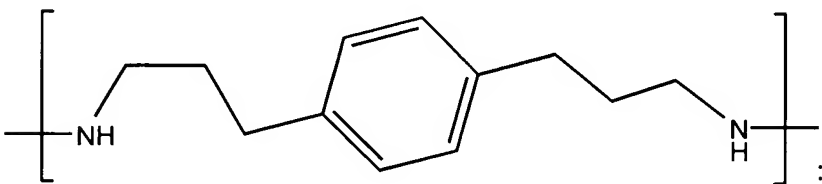
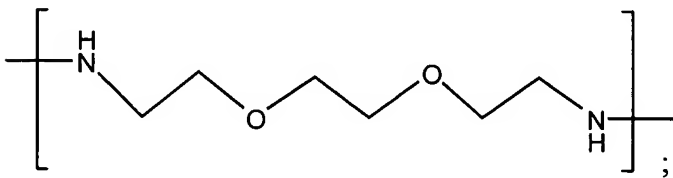
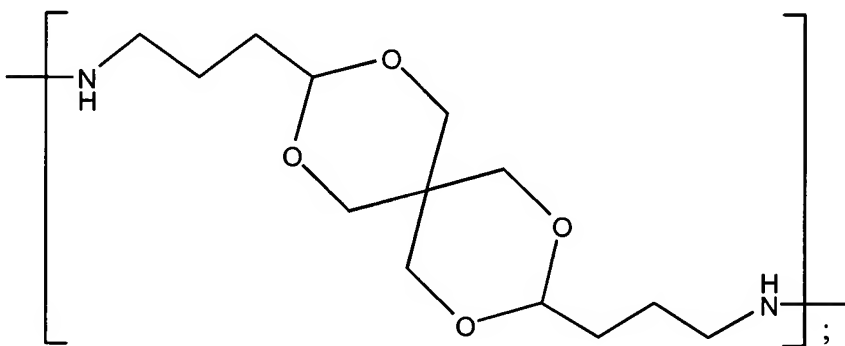
29. The method of claim 28, wherein  $R_2$  is a linker selected from the group  
30 consisting of:



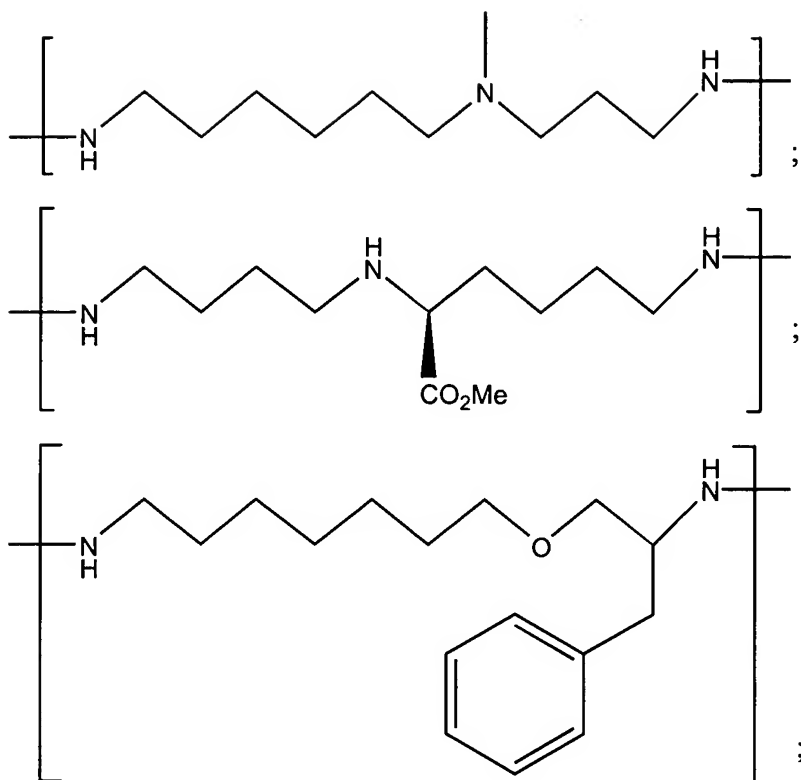
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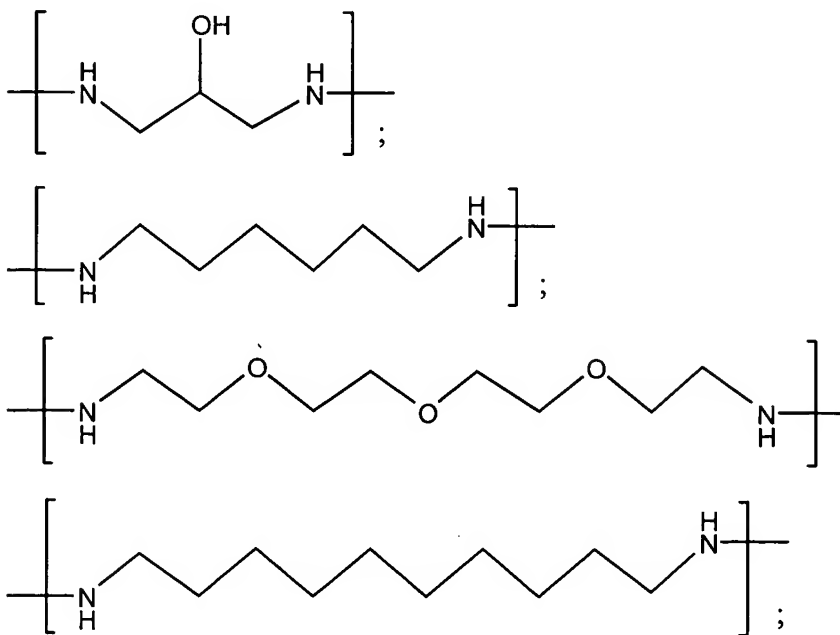


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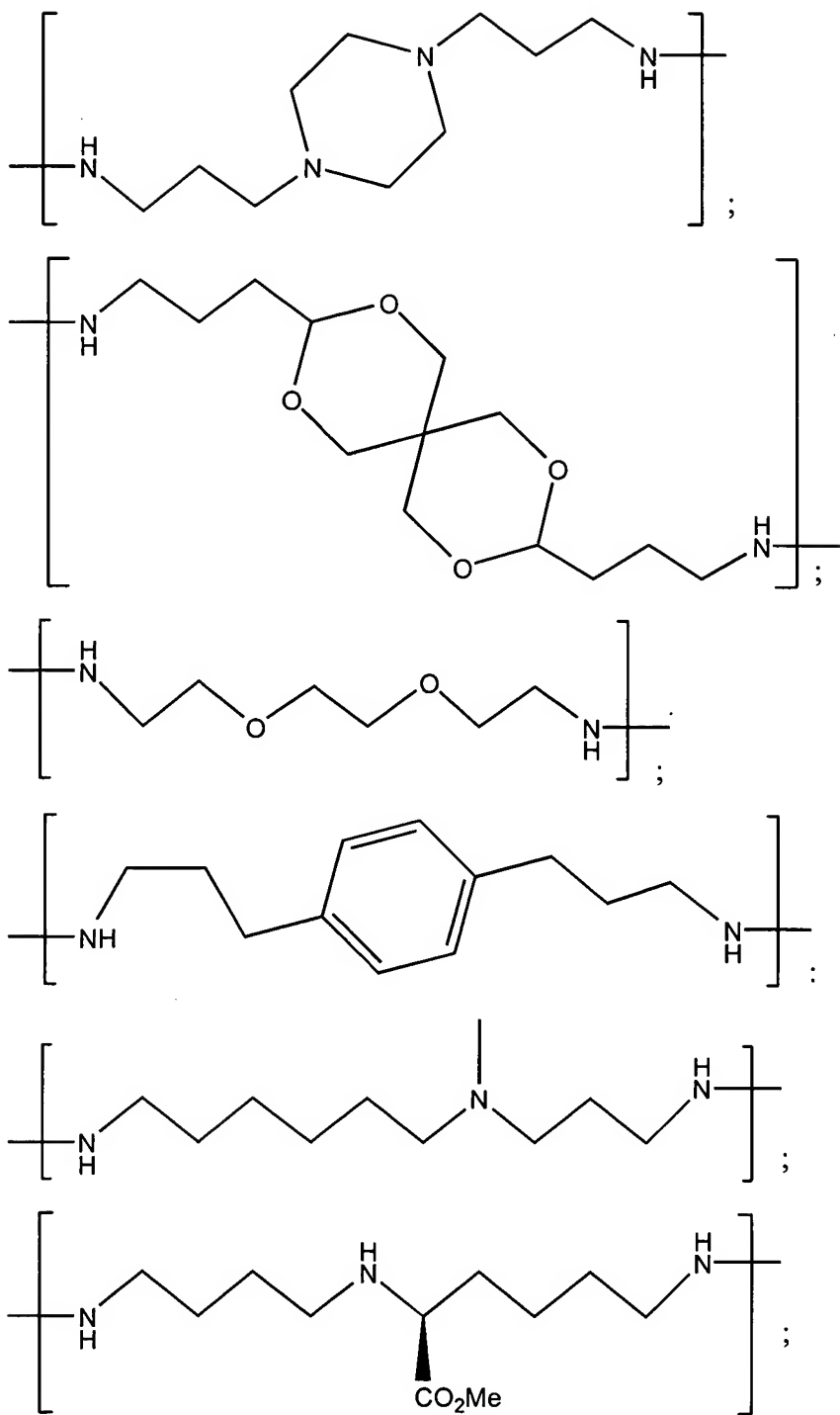
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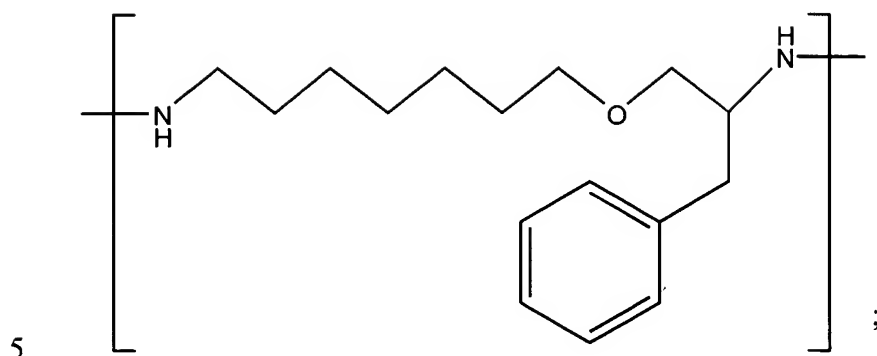
30. The method of claim 28, wherein if  $m$  is more than one, then  $R_2$  is at least one linker selected from the group consisting of:



15

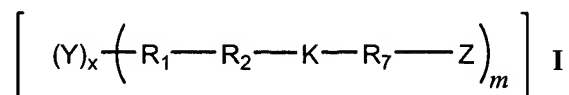
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31. A method for screening a test compound comprising the steps of:

a) contacting a proteome with a nucleotide affinity medium comprising a general formula:



10 wherein Y is a solid support or a tag; x = 1; R<sub>1</sub> is a covalent bond between Y and R<sub>2</sub>, or R<sub>1</sub> is an acyl group, a substituted or a non-substituted alkyl group, a substituted or a non-substituted cycloalkyl group, a substituted or a non-substituted heteroalkyl group, a substituted or a non-substituted heterocycloalkyl group, a substituted or a non-substituted aryl group, a substituted or a non-substituted heteroaryl group, or a combination thereof;

15 R<sub>2</sub> is a substituted or a non-substituted alkyl group, a substituted or a non-substituted cycloalkyl group, a substituted or a non-substituted heteroalkyl group, a substituted or a non-substituted heterocycloalkyl, a substituted or a non-substituted heteroaryl group, or a combination thereof; K is a heteroatom; R<sub>7</sub> is (P)<sub>n</sub> where P is a phosphate or thiophosphate and n is at least one or R<sub>7</sub> is a phosphate group mimic, Z is a nucleotide or

20 nucleoside derivative; and m is at least one.

b) washing the nucleotide affinity medium with a buffer, whereby non-specifically bound components of the proteome are eluted from the nucleotide affinity medium and specific components of the proteome remain bound to the nucleotide affinity medium;

25 c) contacting the nucleotide affinity medium bound with specific components of the proteome with at least one test compound;

d) eluting from the nucleotide affinity medium components of the proteome that are specifically displaced by the test compound; and

- 5                      e)       identifying the components of the proteome that are specifically displaced by the test compound from the nucleotide affinity medium.